

Electronic Supplementary Information

One dimensional CdS based materials for artificial photoredox reactions

Zi-Rong Tang,^{a*} Bin Han,^a Chuang Han,^{a,b} and Yi-Jun Xu^{a,b}

^a College of Chemistry, New Campus, Fuzhou University, Fuzhou, 350116, P.R. China. Tel. /Fax: +86 591 22866126 *E-mail: zrtang@fzu.edu.cn

^b State Key Laboratory of Photocatalysis on Energy and Environment, College of Chemistry, Fuzhou University, Fuzhou, 350002, P.R. China. Tel. /Fax: +86 591 83779326

Table S1 Summary of MoS₂-1D CdS hybrid photocatalysts

Structure	H ₂ evolution rate	Enhancement factor ^a	AQY (λ=420nm)	Sacrificial agents	Reference
ultrathin MoS ₂ NSs-CdS NWs	95.7 mmol·g ⁻¹ ·h ⁻¹	—	46.90%	20 vol% lactic acid	191
MoS ₂ -tip-CdS NRs	8.44 mmol·g ⁻¹ ·h ⁻¹	92	22.20%	28 vol% lactic acid	192
partially crystalline MoS ₂ NSs-CdS NRs	49.80 mmol·g ⁻¹ ·h ⁻¹	130.26	41.37%	10 vol% lactic acid	193
MoS ₂ -CdS core shell NWs	24.65 mmol·g ⁻¹ ·h ⁻¹	64	28.50%	10 vol% lactic acid	194
Metallic 1T phase MoS ₂ NSs-CdS NRs	39.75 mmol·g ⁻¹ ·h ⁻¹	35	—	10 vol% lactic acid	195

^a refers to the enhancing times of photocatalytic H₂ production rate of 1D CdS-MoS₂ composites compared to that of pure CdS.

Table S2 Brief summary of various kind of CdS-cocatalysts towards photocatalytic H₂ evolution

Photocatalyst	H ₂ evolution rate	Enhancement factor ^a	AQY (λ nm)	Sacrificial agents	Ref.(Year)
MoS ₂ -CdS NWs	95.7 mmol·g ⁻¹ ·h ⁻¹	—	46.90% (420)	20 vol% lactic acid	191 (2016)
MoS ₂ -CdS NRs	8.44 mmol·g ⁻¹ ·h ⁻¹	92	22.20% (420)	28 vol% lactic acid	192 (2016)
MoS ₂ -CdS NRs	49.80 mmol·g ⁻¹ ·h ⁻¹	130.26	41.37% (420)	10 vol% lactic acid	193 (2016)
MoS ₂ -CdS NWs	24.65 mmol·g ⁻¹ ·h ⁻¹	64	28.50% (420)	10 vol% lactic acid	194 (2017)
MoS ₂ -CdS NRs	39.75 mmol·g ⁻¹ ·h ⁻¹	35	—	10 vol% lactic acid	195 (2016)
WS ₂ -CdS NRs	61.1 mmol·g ⁻¹ ·h ⁻¹	—	28.9% (420)	20 vol% lactic acid	178 (2016)
NiS-CdS NRs	1131 μmol·g ⁻¹ ·h ⁻¹	20	6.1% (420)	0.35 M S ²⁻ -0.25 M SO ₃ ²⁻	177 (2013)
Cu _x S-CdS NRs	111 μmol·mg ⁻¹ ·h ⁻¹	4	7% (420)	0.75 M S ²⁻ -1.05 M SO ₃ ²⁻	174 (2016)
CuS-CdS NRs	332 μmol·g ⁻¹ ·h ⁻¹	3.5	—	0.35 M S ²⁻ -0.25 M SO ₃ ²⁻	179 (2013)
Ni ₂ P-CdS NRs	553 μmol·mg ⁻¹ ·h ⁻¹	22	41% (450)	0.75 M S ²⁻ -1.05 M SO ₃ ²⁻	196 (2015)
Cu ₃ P-CdS NRs	184 μmol·mg ⁻¹ ·h ⁻¹	6.5	25% (450)	0.75 M S ²⁻ -1.05 M SO ₃ ²⁻	166 (2015)
Fe ₂ P-CdS NRs	186 μmol·mg ⁻¹ ·h ⁻¹	30	15% (450)	0.5 M ascorbic acid	169 (2016)
MoP-CdS NRs	163 μmol·g ⁻¹ ·h ⁻¹	20	5.6% (450)	10 vol% lactic acid	170 (2015)
Co ₂ P-CdS NRs	19.4 mmol·g ⁻¹ ·h ⁻¹	20	6.8% (LEDs)	0.5 M DL-mandelic acid	168 (2016)
Ni ₃ N-CdS NRs	510 μmol·g ⁻¹ ·h ⁻¹	10	13% (420)	0.75 M S ²⁻ -1.05 M SO ₃ ²⁻	181 (2016)
Ni _x B-CdS NRs	4.8 mmol·g ⁻¹ ·h ⁻¹	20	21% (420)	10 vol% lactic acid	182 (2015)
Co ₃ O ₄ -CdS NRs	236 μmol·g ⁻¹ ·h ⁻¹	33	—	0.5 M S ²⁻ -0.5 M SO ₃ ²⁻	155 (2015)
Ni(OH) ₂ -CdS NRs	101.6 mmol·g ⁻¹ ·h ⁻¹	146	28% (420)	25 vol % TEOA	161 (2011)
Co(OH) ₂ -CdS NRs	61.1 μmol·g ⁻¹ ·h ⁻¹	41	—	25 vol % ethanol	162 (2014)
Co(OH) ₂ -CdS NRs	14.43 mmol·g ⁻¹ ·h ⁻¹	206	6.09	25 vol% TEOA	163 (2016)
Co-Pi-CdS NRs	13.3 mmol·g ⁻¹ ·h ⁻¹	2.6	24.3% (420)	lactic acid solution	40 (2016)
Ni-CdS NRs	63 mmol·g ⁻¹ ·h ⁻¹	—	53 % (475)	10 vol % ethanol	57 (2014)
Ni-CdS NRs	25.85 mmol·g ⁻¹ ·h ⁻¹	—	26.8% (420)	1 M (NH ₄) ₂ SO ₃	138 (2015)
Pt-CdSe@CdS NRs	—	—	100% (455)	IPA	130 (2016)
Pt-CdS NWs	29.8 mmol·g ⁻¹ ·h ⁻¹	75	67.1% (420)	10 vol% lactic acid	119 (2013)
Pt-CdS NRs	16.27 mmol·g ⁻¹ ·h ⁻¹	8	—	10 vol% lactic acid	122 (2016)
FeP-CdS NPs	202 μmol·mg ⁻¹ ·h ⁻¹	—	35% (520)	10 vol% lactic acid	165 (2016)
MoS ₂ -CdS NPs	5.4 mmol·g ⁻¹ ·h ⁻¹	36	—	10 vol% lactic acid	188 (2008)
NiS-CdS NPs	7.19 mmol·g ⁻¹ ·h ⁻¹	35	51.3% (420)	30 vol% lactic acid	173 (2010)
Pt-PdS/CdS NPs	28.9 mmol·g ⁻¹ ·h ⁻¹	359.56	93 % (420)	0.5 M S ²⁻ -0.5 M SO ₃ ²⁻	203 (2009)

^a refers to the enhancing times of photocatalytic H₂ production rate of 1D CdS-cocatalyst composites compared to that of pure CdS.